

**I claim:**

1. A system for monitoring rotating machinery comprising:
  - at least one current sensor for detecting shaft grounding current in the
  - 5 rotating machinery;
  - a monitoring device for monitoring real-time shaft grounding current values over time;
  - a detector for determining the change and/or determining the rate of change, in the shaft grounding current;
- 10 an evaluation system for producing a warning as a function of the change and/or rate of change, in the shaft grounding current wherein the warning generated is indicative of a developing problem with the rotating machinery.
2. The system as recited in claim 1 wherein monitoring real-time shaft
- 15 grounding current values over time further comprises sampling real-time shaft current values for data reduction and compression over time.
3. The system as recited in claim 1 further comprising an electric motor
- wherein the warning is indicative of a developing problem with the electric motor.
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4. The system as recited in claim 1 wherein the warning is indicative of a developing problem with the rotating machinery and the warning is further a function of the ratio of peak grounding current to average grounding current.

5. The system as recited in claim 1 wherein determining rate of change in the shaft grounding current further comprises determining a first order derivative of the shaft grounding current.

5 6. The system as recited in claim 1 wherein the warning is further a function of waveform frequency.

7. The system as recited in claim 1 wherein the warning is further a function of rotor rotational frequency.

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8. A system for monitoring rotating machinery comprising:  
at least one voltage sensor for detecting shaft voltage in the rotating machinery;

15 a monitoring device for monitoring real-time shaft voltage values over time;

a detector for determining the change and/or determining the rate of change, in the shaft voltage;

20 an evaluation system for producing a warning as a function of the change and/or rate of change, in the shaft voltage wherein the warning generated is indicative of a developing problem with the rotating machinery.

9. The system as recited in claim 8 wherein monitoring real-time shaft voltage values over time further comprises sampling real-time shaft voltage values for data reduction and compression over time.

5 10. The system as recited in claim 8 further comprising an electric motor wherein the warning is indicative of a developing problem with the electric motor.

11. The system as recited in claim 8 wherein determining rate of change in the shaft voltage further comprises determining a first order derivative of the shaft 10 voltage.

12. The system as recited in claim 8 wherein the warning is further a function of waveform frequency.

15 13. The system as recited in claim 8 wherein the warning is further a function of rotor rotational frequency.

14. A method for monitoring rotating machinery comprising the steps of:  
detecting shaft grounding current in the rotating machinery;  
20 determining rate of change in the shaft grounding current;  
monitoring real-time shaft grounding current values over time;

producing a warning as a function of the change and/or rate of change, in the shaft grounding current, wherein the warning generated is indicative of a developing problem with the rotating machinery.

5       15. The method for monitoring rotating machinery as recited in claim 14 wherein monitoring real-time shaft grounding current values over time further comprises sampling real-time shaft current values for data reduction and compression over time.

10      16. The method for monitoring rotating machinery as recited in claim 14 wherein the warning is indicative of a developing problem with an electric motor.

17.     The method for monitoring rotating machinery as recited in claim 14 wherein the warning is indicative of a developing problem with the rotating  
15    machinery and the warning is further a function of the ratio of peak grounding current to average grounding current.

18.     The method for monitoring rotating machinery as recited in claim 14 wherein determining rate of change in the shaft grounding current further  
20    comprises determining a first order derivative of the shaft grounding current.

19.     The method for monitoring rotating machinery as recited in claim 14 wherein the warning is further a function of waveform frequency.

20. The method for monitoring rotating machinery as recited in claim 14  
wherein the warning is further a function of rotor rotational frequency.

5    22. A method for monitoring rotating machinery comprising the steps of:  
            detecting shaft voltage in the rotating machinery;  
            determining rate of change in the shaft voltage;  
            monitoring real-time shaft voltage values over time;  
            producing a warning as a function of the change and/or rate of change, in  
10     the shaft voltage, wherein the warning generated is indicative of a developing  
problem with the rotating machinery.

23. The method for monitoring rotating machinery as recited in claim 22  
wherein monitoring real-time shaft voltage values over time further comprises  
15     sampling real-time shaft voltage values for data reduction and compression over  
time.

24. The method for monitoring rotating machinery as recited in claim 22  
wherein the warning is indicative of a developing problem with an electric motor.

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25. The method for monitoring rotating machinery as recited in claim 22  
wherein determining rate of change in the shaft voltage further comprises  
determining a first order derivative of the shaft voltage.

26. The method for monitoring rotating machinery as recited in claim 22  
wherein the warning is further a function of waveform frequency.

5 27. The method for monitoring rotating machinery as recited in claim 22  
wherein the warning is further a function of rotor rotational frequency.